

PROACT FACT SHEET



An Environmental Resource sponsored by HQ Air Force Center for Environmental Excellence

Alternative Fuel Vehicles

Current as of May 2005

Overview

To reduce and control air pollution emissions from mobile sources, the Environmental Protection Agency (EPA) developed a strategy that employs the acquisition and use of alternative fueled vehicles. Under the Clean Air Act (CAA) Amendments of 1990, the EPA calls for reductions of air borne toxic chemicals by utilizing clean fuel vehicles (CFVs) that operate on clean burning fuel, instead of conventional petroleum-based fuels. Furthermore, the Department of Energy under the Energy Policy Act (EPA) of 1992 mandates the acquisition of alternative fuel vehicles (AFVs) to decrease America's dependence on petroleum-based products. Both the CAA and EPA provide regulations governing the utilization of alternative or clean fuel vehicles, therefore both federal statutes may apply to fleet operations. For a comparison of AFV requirements between these two statutes see Table 1.0.

In addition, Executive Order 13149 mandates the federal government to reduce petroleum consumption by utilizing AFVs, requiring agencies operating 20 or more vehicles to reduce the annual consumption of petroleum by 20% by the end of Fiscal Year (FY) 2005, using FY 1999 as the baseline. These mandates for fleet operations to acquire AFVs can be met by purchasing, leasing, or converting vehicles currently operating on conventional gasoline.

Non-Petroleum Based Fuels

Air pollution from mobile sources comes from incomplete combustion and evaporation of conventional fuels producing toxic chemical compounds, notably



hydrocarbons (HC), nitrogen oxides (NO_x), carbon monoxide (CO), carbon dioxide (CO₂), and particulate matter (PM). The utilization of vehicles that operate on non-petroleum based fuels not only emit fewer air pollutants, in turn reducing the formation of ground level ozone (O₃) and acid rain, but also assists in decreasing "greenhouse" gases.

Alternative Fuels

The EPA identifies an alternative fuel as any fuel that is substantially non-petroleum, which prohibits air quality degradation by producing fewer toxic chemicals that contribute to air pollution.

➤ **Methanol.** Methanol is an alcohol fuel that can be produced from a variety of sources. It is typically utilized as a blend of 85% methanol and 15% gasoline (M-85); however, some vehicles are capable of utilizing 100% methanol (M-100). Methanol is a high-performance liquid fuel that emits low levels of HC and NO_x.

➤ **Ethanol.** Ethanol is an alcohol fuel very similar to methanol. It is a liquid fuel that can be readily used and is always denatured for commercial or industrial use. Ethanol may also be blended with gasoline and given designations such as E-85 or E-95, and provides similar environmental benefits as methanol, with low HC, NO_x, and CO₂ emission levels.

➤ **Natural Gas.** Natural Gas is a fossil fuel composed of a mixture of hydrocarbons, namely methane. Since natural gas is relatively free of contaminants such as sulfur or nitrogen, combustion does not foul or deteriorate emission control devices and produces less HC, NO_x, PM, and CO emissions. However, natural gas requires special storage facilities - it can be stored as *Compressed Natural Gas (CNG)* or *Liquefied Natural Gas (LNG)*.

➤ **Liquefied Petroleum Gas (LPG).** LPG, also known as *Propane*, is a gas at ambient (normal) temperature and pressure and is composed of a mixture of hydrocarbons, with at least 95% being propane. Propane is a by-product of natural gas processing and petroleum refining and provides for lower HC, NO_x, and CO₂ emissions that in turn reduce ground level O₃.

➤**Electricity.** Electricity, although not actually a fuel, provides energy that is stored in a battery to operate a vehicle. Electric vehicles emit virtually no air pollutants; however, the electricity used is produced at power plants, which do pollute. Regulatory agencies believe controlling air pollutants from a single stationary source, such as a coal-fired power plant, is more efficient and easily maintained compared to emission controls on millions of vehicles.

➤**Hydrogen.** Hydrogen is a very attractive alternative fuel since the only significant air pollutant emitted is NO_x with virtually no HC, CO₂, or CO emitted. Because hydrogen vehicles emit extremely small amounts of CO₂, these vehicles are viewed by regulatory agencies as an especially attractive component in the strategy to reduce global warming trends.

➤**Biofuel.** Biofuel is a fuel derived from biological and natural resources. These fuels do not require vehicle modifications and result in emission reductions of HC, CO, and particulate matter. There are several types of biofuels available; *biodiesel* and *bioethanol* are the two most common.

Clean Burning Fuels

The EPA considers clean burning fuel as any fuel or power source that complies with established emission standards specified in Title 40 Code of Federal Regulations Part 88, Subpart A, "Emission Standards for Clean Fuel Vehicles." The clean burning fuels established by the EPA encompasses all alternative fuels identified by the EPA and includes diesel and reformulated gasoline (RFG). RFG is a formulation of conventional gasoline that is blended with substances, such as ethanol and methyl tertiary butyl ether (MTBE), to increase the fuels oxygen content. Although diesel and RFG emit lower air pollutants than conventional gasoline and are considered clean fuel by the EPA, they do not meet the definition of an alternative fuel.

Acquisition & Implementation

AFV acquisition requirements may be fulfilled either by original equipment manufacturer purchasing, leasing, or converting existing vehicles. Air Force installations implementing an AFV program must adhere to the implementation requirements of Air Force Instruction (AFI) 24-301, which provides guidance on AFV requesting responsibilities, funding, refueling infrastructure, and reporting requirements. Major Commands (MAJCOMs) or installations are responsible for requesting AFV purchases, regardless of fuel type, through the Priority Buy Program to meet federal AFV acquisition mandates.

AFV Availability

The General Services Administration (GSA) provides information on manufacturers and types of AFVs available for federal purchase or lease at <http://www.gsa.gov/Portals/gsa/ep/home.do?tabId=0>

In addition, a report must be submitted to the Support Equipment and Vehicle Management Directorate, Warner Robins Air Logistics Center regarding purchase, lease, and/or conversion as well as the fuel consumed.

Infrastructure

The implementation of a program to use alternative or clean fuels in fleet operations requires knowledge of current operating parameters to make an informed decision about which AFV is best suited to meet existing fleet operation needs. The initial step to implementing a successful AFV program is to analyze current operating parameters and identify vehicle use (cargo or passenger), distance traveled (short or long trips), in-house service and maintenance capabilities, and the affect of inclement weather on vehicle performance. The next step is to address the type of alternative fuel to be used, availability of the alternative fuel, need for a refueling station, and alternative fuel supplier. Finally selecting the proper AFV to meet operational needs is crucial, sine each AFV model varies in performance standards and air pollutant emissions.

Vehicle Conversions

If AFV acquisition mandates are not met, MAJCOMs or installations must ensure any shortages are compensated for through additional AFV leases or conversions. A converted vehicle is any vehicle that was originally manufactured to operate on conventional gasoline and has been modified or altered to operate on an alternative fuel. Leased and converted vehicles do not have to operate solely on an alternative fuel source. A dual fuel vehicle operates on two separate fuels, while a flexible fuel vehicle operates on a mixture of two or more different fuels. Vehicle conversion criteria are set forth in AFI 24-304, establishing what types of vehicles may be converted to utilize an alternative fuel.

Additional Information...

Air Force Personnel may contact the Support Equipment and Vehicles Sustainment Group, Air Logistic Center, Robins AFB, DSN 472-1601, or PROACT at DSN 240-4240 or (800) 233-4356.

Web Sites:

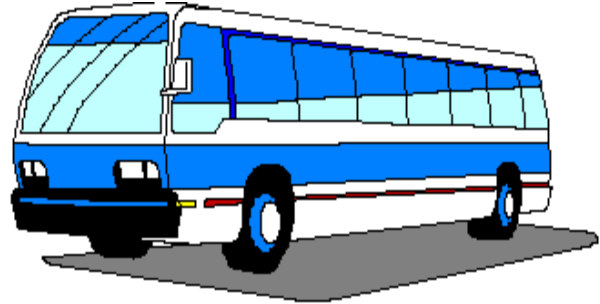
- Alternative Fuels Data Center, DOE, <http://www.eere.energy.gov/afdc/>
- Clean Cities, DOE, <http://www.cities.doe.gov>
- Alternative Fuels, DOE, <http://www.eia.doe.gov/fuelrenewable.html>
- Transportation & Fuels, EPA, <http://www.epa.gov/air/transport/>
- General Services Administration, <http://www.gsa.gov/Portal/gsa/ep/home.do?tabId=0>

Table 1.0, AFV Requirements

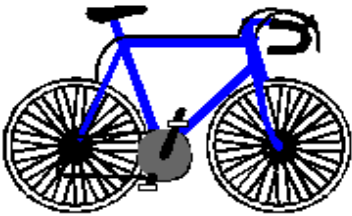
Requirements	Energy Policy Act (EPAct)	Clean Air Act (CAA)
Fleet Operations Affected	Operations with at least 50 vehicles. However, only 20 of these 50 vehicles must meet the criteria for fueling and location.	Operations with at least 10 light duty and heavy-duty vehicles.
Fueling Criteria	Vehicles must be or capable of being centrally fueled.	Vehicles must be or capable of being centrally fueled.
Location Criteria	Areas specified as a Metropolitan Statistical Area (an area with a population of 250,000).	Ozone and carbon monoxide nonattainment areas as designated by the EPA.
Types of fuels	Non-petroleum based "Alternative Fuels."	Fuels that meet Federal "Clean Fuels" emission standards.
Purchase Requirements	Federal agencies must purchase at least 75% AFVs.	Light-Duty Vehicle: 70% CFVs for the year 2001.
		Heavy-Duty Vehicle: 50% CFVs
Exempt Fleet Vehicles	Law enforcement, emergency, non-road, and vehicles certified necessary for national security reasons.	Law enforcement, emergency, non-road, and vehicles certified necessary for national security reasons.

Transportation Alternatives!

If a facility is not mandated to acquire vehicles that operate on alternative fuels, there are other opportunities available to reduce vehicle emissions and improve air quality. Air pollutants from vehicle emissions can be reduced from government or private vehicles by:



- avoiding unnecessary driving,
- properly maintaining vehicles, and
- driving wisely.



Avoiding unnecessary driving is the most effective way to reduce vehicle emissions; however, traffic trends indicate more vehicles are being driven more frequently due to urban sprawl. Several options are available to

commuters to reduce the number of vehicles operated. For instance, the coordination of trips, carpooling, using public transportation, or utilizing alternative forms of transportation such as biking or walking. Utilizing an alternative form of transportation or ridesharing does make a difference.



Vehicle Rating

How does your vehicle rate on air pollution emissions and fuel economy performance. Check out the EPA's "Green Vehicle Guide," available at <http://www.epa.gov/autoemissions>

Properly maintained vehicles not only aid in air quality by ensuring vehicle emission control devices are working effectively, but extends the life of the vehicle and optimizes fuel economy. Taking a vehicle in for regular tune-ups and having emission control devices inspected yields dramatic clean air benefits. Aside from routine inspections and maintenance, drivers can decrease vehicle emissions by keeping tires properly inflated, selecting an energy-conserving grade of motor oil, refueling during "cool" morning or evening hours, and securely closing gas caps after refueling.

Finally, drive wisely by applying common sense, such as maintaining a set speed; avoid stop and go driving; accelerate gradually; avoid idling for more than 30 seconds; minimize air conditioner use; and plan ahead to avoid unnecessary trips to lower vehicle emissions. For more information on this topic, visit *Commuters Choice*, Office of Transportation and Air Quality, EPA, at <http://www.epa.gov/otaq/transp.htm>.

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